WHAT IS CLAIMED IS:

1. A measurement apparatus comprising:

a first detector for measuring an intensity such that a sheet-shaped beam of synchrotron radiation is integrated over the entire range of the beam in the thickness direction of the beam;

a second detector for measuring the intensity of the beam at two points where positions along the thickness direction of the beam are different; and

a calculator for calculating the magnitude of the beam in the thickness direction of the beam on the basis of the detections by said first and second detectors.

2. An apparatus according to Claim 1, wherein said second detector has two detection elements and has a mechanism for moving the detection elements in the thickness direction of the beam.

3. An apparatus according to Claim 1, wherein said first detector has a detector having a photo-receiving surface capable of receiving, at only one time, the beam over the entire range of the beam in the thickness direction of the beam.

4. An apparatus according to Claim 1, wherein said first detector measures a total intensity by detecting accumulated synchrotron current.

5. An apparatus according to Claim 1, wherein said first detector measures a total intensity with respect to a beam extracted from a beam line different from the beam line from which the beam whose intensity is measured at said two points is extracted.

6. An apparatus according to Claim 1, wherein the spacing between the two points is not more than 1.5 times the size of the beam in the thickness direction or not less than 2.5 times the size of the beam in the thickness direction.

7. An apparatus according to Claim 1, wherein said calculating means determines a correction function for calculating the position or the size of the beam in the thickness direction on the basis of a total intensity and said intensities at the two points, on the basis of the results of the measurements of the total intensity, which are performed in advance, and the measurements of said intensities at the two points, which are performed in advance while the detection elements are moved in the

thickness direction of the beam.

8. An apparatus according to Claim 7, wherein the measurements of the total intensity and the intensities at two points, which are performed in advance, are performed under a plurality of conditions in which the synchrotron accumulated current values are different.

9. An apparatus according to Claim 7, wherein the correction function is a polynomial equation.

10. A measurement method comprising the steps of:

measuring an intensity such that a sheet-shaped beam of synchrotron radiation is integrated over the entire range of the beam in the thickness direction of the beam;

measuring the intensity of the beam at two points where positions along the thickness direction of the beam are different; and

calculating the magnitude of the beam in the thickness direction of the beam on the basis of the respective measurements.

11. A method according to Claim 10, further comprising a step for moving the intensity measurement points at two points in the thickness direction of the beam.

12. A method according to Claim 10, wherein the measurement of total intensity is performed by a radiation detector having a photo-receiving surface capable of receiving, at only one time, the beam over the entire range of the beam in the thickness direction thereof.

13. A method according to Claim 10, wherein said measurement of the total intensity is performed by detecting accumulated synchrotron current.

14. A method according to Claim 10, wherein said measurement of the total intensity is performed with respect to a beam extracted from a beam line different from the beam line from which said beam whose intensity is measured at said two points is extracted.

15. A method according to Claim 10, wherein the spacing between said two points is not less than 2.5 times the size of said beam in the thickness direction thereof.

16. A method according to Claim 10, wherein in said calculating step, one of the position and the size of said beam in the thickness direction is calculated on the basis of said total intensity and said intensities at two points

by using a correction function determined on the basis of the results of the measurements of said total intensity, which are performed in advance, and the measurements of said intensities at the two points, which are performed in advance while the intensity measurement point is moved in the thickness direction.

17. A method according to Claim 16, wherein the measurements of the total intensity and the intensities at the two points, which are performed in advance, are performed under a plurality of conditions in which the synchrotron accumulated current values are different.

18. A method according to Claim 16, wherein the correction function is a polynomial equation.

19. An X-ray exposure apparatus comprising:

a mirror for reflecting an X-ray beam from a synchrotron radiation source;

a stage which holds a substrate to be exposed to the X-ray beam; and

a measuring device disposed in proximity of said mirror, for measuring the intensity distribution of the X-ray beam irradiating the substrate, the measuring device comprising:

a first detector for measuring an intensity such that a

sheet-shaped beam of synchrotron radiation is integrated over the entire range of the beam in the thickness direction thereof;

a second detector for measuring the intensity of said beam at two points where positions along said direction are different; and

calculating means for calculating the magnitude of said beam in said direction on the basis of the detections by said first and second detectors.

20. An apparatus according to Claim 19, wherein said first and second detectors are disposed so as to detect the beam incident on said mirror.

21. An apparatus according to Claim 19, further comprising means for obtaining intensity distribution of said beam on said substrate using a function of S and σ, S being the detection output of said first detector, and σ being a standard deviation when the intensity distribution is approximated by a Gaussian distribution.

22. An apparatus according to Claim 19, further comprising a correcting mechanism for correcting the exposure of the substrate so as to evenly expose the substrate.

23. An apparatus according to Claim 22, wherein said correcting mechanism comprises a movable shutter.

24. A semiconductor device manufacturing method comprising:

generating an X-ray beam from a synchrotron radiation source;

reflecting the X-ray beam by a mirror to irradiate a substrate with the X-ray beam;

measuring in proximity to said mirror, intensity distribution of the X-ray beam irradiating the substrate, the measuring step comprising:

measuring an intensity such that a sheet-shaped beam of synchrotron radiation is integrated over the entire range of the beam in the thickness direction thereof;

measuring the intensity of said beam at two points where positions along said direction are different; and

calculating the magnitude of said beam in said thickness direction on the basis of the respective measurements; and

exposing the substrate to the X-ray beam so as to transfer patterns of a semiconductor device.

25. A method according to Claim 24, wherein said

detection steps comprise detecting the beam incident on said mirror.

26. A method according to Claim 24, further comprising obtaining intensity distribution of said beam on said substrate using a function of S and σ, S being the integrated detection intensity, and σ being a standard deviation when the intensity distribution is approximated by a Gaussian distribution.

27. A method according to Claim 24, further comprising correcting the exposure of the substrate so as to evenly expose the substrate.